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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/721,464	11/26/2003	Hideki Shoji	246008US2	8112

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EXAMINER	
BERHANU, SAMUEL	

ART UNIT	PAPER NUMBER
2838	

NOTIFICATION DATE	DELIVERY MODE
06/13/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/721,464	SHOJI, HIDEKI	
	Examiner	Art Unit	
	Samuel Berhanu	2838	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 December 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3,5,7,9,11,13,15,17,19,21 and 23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,5,7,9,11,13,15,17,19,21 and 23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11/26/2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1,3,5,7,9,11,13,15,17,19,21,23 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Kawakami et al**. [6563318]

As to claim 1, Kawakami discloses in figures 1-34 a method of confirming battery charge amount and degradation state, comprising the steps of: measuring at a plurality of battery temperatures a cycle test battery in respect of one selected from battery open voltage, current and voltage during discharge, and current and voltage during charging at predetermined time intervals substantially until battery end of life [see e.g. column 4, lines 61-67; column 5, lines 45-55];

> The detecting method according to the present invention comprises: (i) a step in which a plurality of normal non-deteriorated rechargeable batteries are provided, these batteries are separately subjected to charging and discharging under various temperature conditions and at various rates of charge or discharge where their battery voltages, and their presently stored electricity
>
> (2) For a normal rechargeable battery in a full charged state, battery voltages Vd are measured under various temperature conditions T and at various discharge rates Id. The charging is tentatively suspended, where the open-circuit voltage (Voc) is measured. Data or function formula Vd(Voc, Id, T) of the relationship of the battery voltages Vd to the Id, Voc and T. Or the data or function formula Vd(Q, Id, T) or Q(Vd, Id, T) computed from the data or function formula of the relationship of the Voc(Q) of the open-circuit voltage (Voc) to the remaining capacity (Q) described in the above (1).

using measured values to generate a determination table showing relationships between prescribed charge amounts and prescribed degradation states [see e.g. column 3, lines 25-30; column 52, lines 49-56; column 53, lines 37-46];

a method wherein for a rechargeable battery, the battery voltage when a prescribed current is applied for a prescribed period of time is measured and the measured battery voltage is collated with a previously established battery voltage-residual capacity corresponding table to obtain a residual capacity of the battery. However, for a rechargeable battery

In this embodiment, from the curves of the battery characteristics obtained in this way, the open-circuit voltages to optional remaining capacities were read to obtain discrete data and based on the discrete data, a data base (a data table) for the relationship of the open-circuit voltage Voc to the remaining capacity Q was prepared. In addition, from the data base, a function formula Voc(Q) of an approximate curve with respect to said data base.

In Table 1 as an example of the foregoing data tables obtained in the above for the lithium ion rechargeable battery (having a diameter of 17 mm, a length of 67 mm, and a nominal capacity of 1300 mAh), there are shown relationships of the open-circuit voltage Voc(V) to the remaining capacity Q [Ah] upon the discharging operation and those of the battery voltage Vd(V) at each of constant currents Id (=0.13 A, 0.26 A, 0.65 A, 1.3 A, 1.95 A, and 2.6 A) when the battery temperature is 25.degree. C. to the remaining capacity Q [Ah] upon the discharging operation.

measuring a subject battery in respect of same said one selected from battery open voltage, current and voltage during discharge, and current and voltage during charging see e.g. column 4, lines 59-67; column 5, lines 1-17; column 6, lines 24-32];

The detecting method according to the present invention comprises: (i) a step in which a plurality of normal non-deteriorated rechargeable batteries are provided, these batteries are separately subjected to charging and discharging under various temperature conditions and at various rates of charge or discharge where their battery voltages, and their presently stored electricity quantities (their electricity quantities capable of being discharged) or their discharging capacities are obtained, and from these factors, basic data are obtained; and (ii) a step in which for a rechargeable battery (ii-a) to be detected, the voltage value or/and the current value thereof are measured, and the measured result is compared with said basic data to judge: (a) the rechargeable battery (ii-a) is short-circuited, (b) the internal resistance of the rechargeable battery (ii-a) is increased, (c) the electricity storable capacity (the quantity of electricity capable of being stored) of the rechargeable battery (ii-a) is decreased, (d) the electricity storable capacity of the rechargeable battery (ii-a) is decreased and the internal resistance thereof is increased, or (e) the rechargeable battery (ii-a) is not deteriorated (normal).

According to the detecting method for detecting internal state of a rechargeable battery in the present invention, on the basis of the foregoing basic data or function formulas and in accordance with a prescribed judgment mode while referring to information selected from the open-circuit voltage, battery voltage and internal resistance of a rechargeable battery to be detected in a shutdown state, a charging state, or a discharging state, it is possible to precisely detect the internal state of rechargeable battery.

FIGS. 18(1) to 18(3) and FIGS. 19(1) to 19(2) are of a normal rechargeable battery and they show respectively a relationship of the open-circuit voltage, the charging voltage or the discharging voltage, the internal resistance and the open-circuit voltage, the battery voltages at two kinds of discharge rates (discharging currents), and the discharging voltages at two kinds of battery temperatures, respectively in relation to the remaining capacity.

FIG. 32 shows a graph of a change with the passage of time in the battery voltage when a commercially available lithium ion rechargeable battery whose nominal capacity is 1300 mAh was subjected to constant current-constant voltage charging and thereafter, a cycle of conducting discharging operation and pausing the discharging operation was repeated.

and comparing determination table values with a measured value of the subject battery to confirm present subject battery charge amount and degradation state in accordance with a determination table location of matching values states [see e.g. column 3, lines 25-30; column 52, lines 49-56; column 53, lines 37-46; tables 1-8];

In this embodiment, from the curves of the battery characteristics obtained in this way, the open-circuit voltages to optional remaining capacities were read to obtain discrete data and based on the discrete data, a data base (a data table) for the relationship of the open-circuit voltage Voc to the remaining capacity Q was prepared. In addition, from the data base, a function formula Voc(Q) of an approximate curve with respect to said data base.

TABLE 1

remaining capacity (Ah)	Voc (V)	Vd (V) Id = 0.13A	Vd (V) Id = 0.26A	Vd (V) Id = 0.65A	Vd (V) Id = 1.3A	Vd (V) Id = 1.95A	Vd (V) Id = 2.6A
1.3	4.189	4.172	4.158	4.094	4.043	3.959	3.894
1.2	4.111	4.077	4.050	3.945	3.852	3.728	3.619
1.1	4.044	4.012	3.980	3.876	3.779	3.654	3.545
1.0	3.986	3.944	3.921	3.804	3.710	3.598	3.500
0.9	3.933	3.893	3.860	3.757	3.655	3.555	3.460
0.8	3.879	3.841	3.821	3.705	3.611	3.501	3.408
0.7	3.833	3.795	3.767	3.656	3.563	3.463	3.378
0.6	3.806	3.772	3.740	3.629	3.538	3.440	3.356
0.5	3.789	3.755	3.727	3.606	3.510	3.407	3.320
0.4	3.770	3.724	3.690	3.567	3.474	3.375	3.290
0.3	3.747	3.701	3.670	3.547	3.457	3.358	3.268
0.2	3.712	3.680	3.642	3.507	3.425	3.316	3.215
0.1	3.676	3.622	3.583	3.409	3.334	3.225	3.125

TABLE 2

	open-circuit voltage (V)	detected remaining capacity (Ah)	discharged quantity (Ah)	(detected remaining capacity-discharged quantity)/nominal capacity × 100 (%)
Sample 1	4.006	1.0563	1.0512	-0.2231
Sample 2	3.837	0.6633	0.6712	-0.5077
Sample 3	3.735	0.2720	0.2512	-0.7546

With regard to the patent additionally considering an internal resistance for the subject/inspective battery for detecting the subject/inspective battery charge amount and degradation state: eliminating considering an internal resistance for the subject/inspective batten/, cited in the Kawakami reference, applicant neither confirms the charge amount, nor makes it easier to accurately gauge the remaining charge and degradation state of a battery, which is the object of his invention, as cited in the disclosure. Therefore it would be obvious to one skilled in the art at the time the invention was made that the elimination of an element and its function in a combination is an obvious expedient if the remaining elements perform the same functions as before. See Exparte Wu, 10 USPQ 2031 (Bd. Pat. App. & Inter. 1989), In re Larson, 340 F.2d 965, 144 USPQ 347 (CCPA 1965) and In re Kuhle, 526 F.2d 553, 188 USPQ 7

(CCPA 1975).

As to claims 3,5,7,9,11,13,15,17,19,21,23, see remarks and reference above.

Response to Arguments

3. Applicant's arguments filed 12/15/2006 have been fully considered but they are not persuasive.

Applicant argues that Kawakami does not teach or suggest the measurement being made plural times until the end of life of the battery. This is incorrect, Kawakami discloses periodically detecting and inspecting deterioration of the battery prior to the battery is fully depleted. Therefore, the measurements are taken until the end of life of the battery.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel Berhanu whose telephone number is 571-272-8430. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Karl Easthom can be reached on 571-272-1989. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

KARL EASTHOM
SUPERVISORY PATENT EXAMINER

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SB